MODIS DATA STUDY
TEAM PRESENTATION

May 24, 1991

AGENDA

1. Action Items
2. Granule Size and Scheduler
3. MODIS Airborne Simulator
4. Assumptions/Tracking List
5. Assumptions Documentation
6. Input Data Survey Forms

ACTION ITEMS:

05/03/91 [Tom Goff and Team]: Document plans for Level-1A and Level-1B processing, and indicate what information will be included in each product. Include a list of assumptions, brief rationale, scenarios, and trade-offs. This document is being prepared. STATUS: Open

05/03/91 [Tom Goff and Lloyd Carpenter]: Prepare an assumptions list, to be periodically included in the minutes with the changes highlighted. The list will be distributed as appropriate. An updated draft version will be presented at today's meeting. STATUS: Open

05/10/91 [Lloyd Carpenter]: Check with Daesoo Han about the decision that SCA will schedule MODIS processors based upon a requirement to process rather than availability of data. The EOSDIS people will not discuss the matter at this time because of the procurement. Daesoo says that EOSDIS will control the scheduler. The SCA will not schedule the processing of data until the data is available. The remaining matter is to provide a table of data availability. This may be the responsibility of the SDST. STATUS: Open

05/17/91 [Liam Gumley]: Ask Paul Menzel, Yoram Kaufman, and Mike King what data processing they would like done for the MAS. If support is provided by the SDST, we must determine what is involved in getting ready, including determination of data volume, documentation, calibration, required staff, skills, time, and equipment. A progress report will be presented at today's meeting. STATUS: Open

05/17/91 [Liam Gumley]: Ask Fred Shaffer about the availability of MCIDAS at GSFC. Liam spoke to Fred on May 23rd. Fred says he is not aware of any MCIDAS capability currently at GSFC. The MCIDAS which was previously available on the CYBER 205 was not converted to the new system. STATUS: Closed

05/17/91 [Harold Geller]: Find out if John Barker will be involved in calibration for the MAS. John Barker says he will not be involved in the MAS calibration. He may, however, look at some of the data after the fact. STATUS: Closed.

05/17/91 [Lloyd Carpenter and Al McKay]: Identify those "before launch" input data requirements which will involve assistance from the SDST. A progress report will be given at today's meeting. STATUS: Open

GRANULE SIZE AND SCHEDULER

OPEN DISCUSSION

Notes on conversation with Paul Menzel regarding MODIS Airborne Simulator

Liam Gumley

May 22, 1991

The topic of discussion was the general plan and timetable for the use of data from the MAS (MODIS Airborne Simulator). The MAS (which is yet to be configured) will be based on the Daedalus WILDFIRE sensor, a multispectral scanner designed to image wildfires. The WILDFIRE is a new instrument, however it shares many characteristics of the MAMS (Multispectral Atmospheric Mapping Sensor) which is a derivative of a Daedalus instrument.

The principal drivers of the MAS instrument development are Paul Menzel and Mike King. Their interests are in the study of cloud parameters using both infrared and visible data. There has been some interest expressed in MAS data on the part of other MST members, however their specific plans for MAS data processing are not yet known.

The intention is to have the WILDFIRE modified to "pre-MAS" configuration for flights during the next FIRE (First ISCCP Regional Experiment) in November 1991. The instrument would be modified to full "MAS" configuration in early 1992. The calibration of the infrared channels of the MAS will be done using data from two onboard black bodies, as is done with the MAMS. No visible calibration will be available onboard. Visible calibration will be done both pre and post flight using an integrating sphere. This is also the case for the MAMS. Because of this, there is an inherent difficulty in verifying the absolute and relative calibration of the visible channel data.

Twelve 8-bit spectral channels in the visible and infrared regions will be available on the MAS in flight from a selection of fifty channels. The selection of spectral channels for the MAS is yet to be finalized. However in the pre-MAS configuration for November 1991, Paul wants to see infrared channels at 8.6-9.0, 9.4-9.8, 10.7-11.2, 12.2-12.7 and 12.7 to 13.2 microns. A few of these channels may collect data at 10 bits resolution, causing the exclusion of at least one of the visible channels. (An eight bit visible channel storage buffer is used to hold the extra two bits from the infrared channel). Mike King requires visible channels in the region of 0.47, 0.66, 0.87, 0.91, 0.94, 1.64, 2.13 and 3.75 microns. As stated, the final channel selection is yet to be decided. Paul stressed that based on previous experience with the MAMS, the infrared data from the proposed MAS may be quite noisy. One of the first tasks as far as data processing goes will be to evaluate the quality of the MAS infrared data. It is yet to be determined what input other MST members will have to the final MAS channel selection.

Since Paul already has available a suite of MAMS processing code, he is not planning to do anything in the area of code development in the immediate future. The processing system at Wisconsin is

the Man-Computer Interactive Data Access System (MCIDAS). The actual data processing would be performed by Chris Moeller.

Mike King cannot be contacted at present, as he is in Kuwait until around the end of June. Paul was not sure what plans Mike has for processing the data. However if Mike wants to process the data at GSFC, then presumably he will need someone to go to Wisconsin to obtain the navigation and calibration software and documentation, and talk with the people there about the implementation of the processing code on a different system. A clear estimate of the manpower needed to implement the code is not yet possible, as it depends on what system Mike King has available. Questions involving specific details of issues such as navigation and calibration will best be resolved by direct contact with Wisconsin.

Recommended further action

Discussion needs to be initiated with Mike King, Yoram Kaufman and other MST members regarding the processing system they would like to see implemented at Goddard. Depending on what resources are already available, we may need to investigate issues such as

- computer platform (Silicon Graphics, PC, VAX, IBM Mainframe)
- native language (MAMS code on MCIDAS is in FORTRAN)
- computational loading/overheads
- image display and hardcopy generation requirements
- access to 9 track tape drives (MAS data will be on 9 track CCT) from target processing system
- documentation available for data stream, and for processing code
- method for distribution of MAS data and/or products to other MST members
- manpower required
- timeframe needed to implement processing system before MAS data becomes available (pre-MAS data will be taken in November 1991)
- data volumes for specific flight programs
- regions and times of interest for MAS overflights

LG
5/22/91

Assumptions/Tracking List
for the
MODIS Science Data Support Team
24 May 1991

This list of assumptions, tracking items and questions is intended to clarify issues and prevent misunderstanding. The list can be changed as necessary.

LEVEL-1A PROCESSING ASSUMPTIONS

1. MODIS Data. All Level-0 data packets with an Application Process ID that designates MODIS data will be retained in the MODIS Level-1A product.

2. Data Granules. MODIS Level-1A data will be stored as granules with a granule header. Each granule will consist of a number of complete scan cubes. Each granule shall contain no more data than that taken during an orbital period.

3. Data Packets. Each MODIS scan cube will consist of a number of complete data packets which are numbered sequentially in time order within the scan. Each data packet will be provided with a secondary header that includes the packet sequence counter and the scan sequence counter

4. Scan Cube Boundaries. Each MODIS data packet will be contained within a single scan cube. Thus, the scan cube boundaries coincide with packet boundaries.

5. Instrument Status Comparison. The MODIS Level-1A processing will not check instrument states contained in the Level-0 header against the Instrument Status Information issued by the ICC.

6. Level-1A Data Quality Checks. There will be no detailed, or pixel-by-pixel, data quality checks at Level-1A, other than the detection of problems which make the data unsuitable for archival, or prevent the completion of Level-1A processing.

7. Quick-Look. Level-1A Quick-Look data will be generated using the same version of software as is used for the standard Level-1A product. Quick-Look processing may require prior time-ordering, redundancy elimination, and quality control measures not required of standard Level-1A processing.

8. Reversibility. Level-1A processing will be reversible to time ordered packets of Level-0 data with redundancies eliminated.

9. Reversing Software. A separate software package will be provided to reverse Level-1A data to Level-0.

10. Ancillary Data. Spacecraft ancillary data, including satellite position and attitude knowledge, will be supplied by the EOS project before Level-1A processing. The ancillary data will be obtained in a process external to the MODIS Level-1A processing. It will be appended (but not applied) to the Level-1A data.

11. Data Storage. The Level-0 data packets and the MODIS program backing stores will be local to the computer performing the MODIS processing.

12. Engineering Data. MODIS Level-1A processing will compare and evaluate instrument engineering values at both the packet processing stage and at the scan cube processing stage.

13. Processing Log. The MODIS Processing Log will consist of a time ordered list of all MODIS processing events. The Processing Log will receive messages in time order from all MODIS processing programs (Level-1A, Level-1B, Level-2, etc.).

14. Land/Ocean Flags. Land/Ocean, Cloud, or other derived flags will not be included in the Level-1A data product. The Level-1A product will be supplied without separation into land/ocean or other categories.

15. Level-1A Browse. There will be no Level-1A browse product.

16. Data Compression. No data compression will be performed within the MODIS Level-1A processing.

LEVEL-1B PROCESSING ASSUMPTIONS

1. Data Granules. During Level-1B processing, the data contained in each MODIS Level-1A data granule will be subdivided into a time-ordered sequence of Level-1B data granules. Each Level-1B data granule may be considered as consisting of a time-ordered sequence of "scenes", each of which is made up of a time-ordered sequence of "scan cubes". Each scene covers a more-or-less square area on the earth's surface.

2. Coordinate System. Coordinates will be represented in the geodetic latitude-longitude coordinate system on the standard 1984 oblate spheroid.

3. Anchor Points. For each scan, a set of anchor points will be selected for interpolating the ground locations of pixels within the scan. (See the report "An Analysis of MODIS Anchor Point Accuracies for Earth Location". MODIS Data Study Team, Revised: April 5, 1991.)

4. Anchor Point Parameters. The following parameters will be provided in the Level-1B data set for each anchor point: earth location (geodetic latitude-longitude) of the pixel, satellite slant range, satellite azimuth and zenith angles, and solar azimuth and zenith angles (all with respect to the pixel).

5. Anchor Point Error Statistics. No measure of earth location accuracies based upon anchor points will be included in the Level-1B data product.

6. Feature Identification No Feature Identification/Ground Control Points will be used at Level-1B for earth location.

7. Level-1B Elevation Correction. There will be no terrain elevation correction (beyond the basic spheroid) to earth location at Level-1B.

8. Platform Position and Attitude Knowledge. MODIS Level-1B processing will use the satellite position and attitude knowledge supplied by the EOS project and appended to the Level-1A data.

9. Atmospheric Correction. No atmospheric correction will be applied to the MODIS level-1B data.

10. Land/Ocean Flags. Land/Ocean, Cloud, or other derived flags will not be included in the Level-1B data product.

11. Land/Ocean Level-1B Products. The Level-1B product will be supplied without separation into land/ocean or other categories.

12. Level-1B Browse. The Level-1B processor will not generate browse products. A separate browse processor will be used to

provide for easy adaptation to technology advances.

13. Required Ancillary Data. All information required for MODIS Level-1B processing will be included in the MODIS Level-1A product.

14. Calibration. Calibration algorithms and parameter values will be provided by the MCST prior to Level-1B processing. They will be incorporated into the Level-1B software.

15. Engineering Data. MODIS Level-1B processing will extract instrument engineering values from the Level-1A data as needed for calibration.

16. Instrument Status Comparison. The MODIS Level-1B processing will not check instrument states against the Instrument Status Information issued by the ICC.

17. Level-1B Data Quality Checks. There will be no detailed, or pixel-by-pixel, data quality checks at Level-1B, other than the detection of problems which make the data unsuitable for archival, or prevent the completion of Level-1B processing.

18. Level-1B Quick-Look. Level-1B Quick-Look data will be generated using the same version of software as is used for the standard Level-1B product.

19. Data Compression. No data compression will be performed within the MODIS Level-1B processing.

20. Data Storage. The Level-1A data granules and the MODIS program backing stores will be local to the computer performing the MODIS Level-1B processing.

21. Processing Log. The MODIS Processing Log will consist of a time ordered list of all MODIS processing events. The Processing Log will receive messages in time order from all MODIS processing programs (Level-1A, Level-1B, Level-2, etc.).

QUESTIONS AND ISSUES:

Where will the cloud/no-cloud flag come into the system?

Will the scheduler check to see that the required data is available before calling the MODIS processor?

The answer is yes. However we may be required to generate the table of data availability

Is there any circumstance under which the MODIS-T instrument will be changing tilt during a scan? If so, is it possible to determine pixel locations during a change in tilt?

Assumptions/Tracking List

for

The MODIS Level-1B Process Design

MODIS Science Data Support Team

23 May 1991

This document contains a list of items that have either been assumed in the derivation of the MODIS Level-1B preliminary design or need to be tracked as part of the overall MODIS Science Data Support Team (SDST) effort. Items that are included for tracking will be resolved in the future. Items that are assumptions have been included in the current concept of the design but may be modified in future revisions of the design as it becomes further refined. This list is generated during the design of the MODIS Level-1B process, therefore the companion assumptions/tracking lists for the other processors should also be consulted for completeness.

Ground Navigation. Selected pixels, not the entire scan, will be navigated to Earth ground locations.

A scan wise non-linear set of ground control (anchor) points has been selected to represent the lat-long locations of pixels within a scene. A report illustrating the accuracies and scan wise placements of these anchor points has been published by the MODIS science data support team. The ground locations of the selected pixels are determined solely from the satellite position, attitude, and instrument geometry without the use of ground control points.

Anchor Point Coordinate System. Selected Earth location points, represented in the geodetic Latitude Longitude coordinate system, will be included in the Level-1B data set.

Coordinate transformations from the EOS platform inertial coordinate system to the ground based lat-long coordinate system will be performed by the MODIS processors using standardized transformation routines. Latitude and longitude will be in the geodetic rather than the geocentric coordinate system.

Earth Model. The Earth location anchor points will be derived using the 1984 oblate spheroid (rotated ellipsoid) representation.

Anchor Point Parameters. At the selected ground anchor points, the following parameters will be provided: Earth position in Lat-Long, satellite zenith and azimuth angles, solar zenith and azimuth angles, and satellite slant range.

Other needed parameters such as solar to spacecraft relative azimuth and zenith angles can be easily calculated from these appended parameters. The slant range facilitates the computation of any digital elevation model (DEM) corrections in later processes without referencing additional information which would cause configuration management problems associated with a dynamic database.

Level-1B Elevation Correction. There will be no terrain elevation corrections to anchor point positions at Level-1B.

The correction of the anchor points for terrain elevation may be included in the Level-2 or above products. An Earth geoid based elevation data set is proposed to be included in an implementation of a digital terrain model (DTM) in the future and will be performed at all pixels, not just the anchor point pixels.

Platform Position and Attitude Knowledge. All satellite positioning and attitude knowledge will be supplied to the MODIS process by the EOSDIS project before the MODIS process is executed.

This implies that the MODIS process will not be executed before the spacecraft position and attitude are known and that if the spacecraft position or attitude are updated after the MODIS data product has been produced, a MODIS reprocessing may have to be initiated by an outside authority. The current MODIS design appends the satellite attitude and position to the Level-1A data product. This can lead to a lack of concurrency (more than one copy of a data set) with the attendant danger of not having the current, most accurate data.

Atmospheric Correction. Atmospheric correction will not be performed in the MODIS level-1B process.

Bending of the scan vector due to atmospheric refraction has been shown to be negligible.

Anchor Point Flags. Cloud, land/ocean, or other derived flags will not be included in the Level-1B data products.

These flags are best applied to every pixel, not just the anchor points. An indication of the percentage of ocean, land, or cloud cover may be included in the future for metadata purposes in Level-1B.

Anchor Point Error Statistics. No statistical measure of anchor point accuracies will be included in the Level-1B data product.

An indication of the anchor point statistical accuracies can be derived externally in a non time critical environment and is not unique to an individual data product. Accuracies are to be derived from platform knowledge parameters initially and verified via off-line methods to be available after the MODIS data has been published.

Browse Requirements. The Level-1B process will not generate a browse product.

Any required browse products will be generated by a separate process in order to take full advantage of future technologies without compromising the main data product processing. This allows technologies such as those currently in development for high definition television (HDTV), windowed graphical user interface (GUI) laser based video, or similar approaches to be used as they are developed without

compromising the Level-1B product generation process. This also allows for the concept of 'on-the fly' browse to be implemented.

Required Ancillary Data. No ancillary data (in-situ) will be required for the MODIS Level-1B processing.

Calibration methodologies have not be determined at present, but are currently assumed to not require in-situ ground based data.

MODIS Configuration Management. Calibration algorithm or coefficient changes will force a revision to the MODIS processing program.

Configuration management will be applied to the MODIS programs and will not allow a change in methodology to a configured process. A full validation will be performed even if calibration coefficients have been altered.

Quality Assurance Checks. Formal quality control determination will not be performed by the MODIS Level-1B process, other than the detection of problems which will compromise the integrety of Level-1B processing.

Specific requirements for items that may be included in any future quality assurance or data quality checks have not been identified at the present time. Quality checks may be included in later design revisions when specified.

Anomaly Detection. The MODIS Level-1B process will post problem and anomaly reports only to the MODIS data product log.

This log will be accessible to other processes on a read-only basis to allow problem and event anomalies to be tracked. Any requirements to alert other processes (such as the MODIS Data Characterization Team) of anomaly occurrences have not been determined at this time.

Instrument Command Comparison. The MODIS Level-1B process will not check instrument states with respect to the Instrument Command and Control (ICC) processes.

The ICC log will not be available for examination until 48 hours after items have been posted to the log. This time constraint does not allow the MODIS process to compare telemetered data with commanded states. Problems or anomalies detected in the telemetered data stream will be posted to the MODIS data product log and made available to other processes as necessary.

Data Compression. No data compression will be performed within the MODIS Level-1B process.

Data compression is best performed either in hardware or in software during the transfer of data to and from the mass storage devices. Note that hardware compression techniques can be emulated in software that can be distributed as auxiliary processes or subroutines to outside (of EOSDIS) organizations.

MODIS-T Tilt Stability. A 'Tilt-in-progress' indicator will be provided in the telemetered data stream.

This is required to determine if correct ground anchor points can be calculated during a changing tilt scenario. A data bit and/or tilt encoder position before and after the Earth scan can be added to the telemetry stream to accommodate this requirement.

Input Data Survey

Non-EOS Data Requested from EOSDIS

MODIS Facility Instrument

Team Leader: Salomonson

INPUT DATA PRODUCT NAME	DATA TYPE	TIME FRAME	SOURCE		COMMENTS
			INSTR	DATA CENTER	
MERIS Data	Anc	PL	MERIS		Abbott (if MODIS-T is replaced by MERIS)
AVHRR radiances for SST and SST products	Dev	PL	AVHRR		Barton (for comparison with ATSR SST fields)
Buoy and Ship SST Measurements	Cor	BL,PL	in-situ		Barton (for SST validation, ground truth)
Surface Wind Observations	Dev	BL	Adeos/NSCAT		Brown (for Glitter)
AVHRR Sensor Observations	Dev	BL	AVHRR	NOAA/NESDIS	Brown (prelaunch algorithm development)
ARGOS Drifting Buoy SST Observations	Dev,Cor	BL,PL	in-situ	NOAA/NMC or NOS	Brown
Ship of Opportunity Surface Observations	Dev,Cor	BL,PL	in-situ	NODC, NCC or NMC	Brown
CZCS Data	Dev	BL	CZCS		Carder (Level-1 and Level-1.5 : 50 scenes per year)
SeaWiFS Data	Dev	BL	SeaWiFS		Carder (Level-1 and Level-1.5 : 200 scenes per year)
Adeos/OCTS Data	Dev	BL	Adeos/OCTS		Carder (Level-1 and Level-1.5 : 200 scenes per year)
SeaWiFS Data	Dev	BL	SeaWiFS		Esaias
Adeos/OCTS Data	Dev	BL	Adeos/OCTS		Esaias
Joint Global Ocean Flux Study (JGOFS) Data	Dev	BL	in-situ		Esaias
Surface Atmospheric Pressure	Anc	AL,PL	NOAA/NMC		Gordon/Evans (to compute Rayleigh radiance)
Surface Wind Speed	Anc	AL,PL	NOAA/NMC		Gordon/Evans (for computing sun glitter)
Atmospheric Ozone Concentration	Anc	AL,PL	TOMS/GOMR		Gordon/Evans (low resolution (100 km) from TOMS/GOMR or AIRS/AMSU)
Sea Surface Temperature Imagery	Anc	AL,PL	AVHRR		Hoge (mid-Atlantic test site)
Simulated MODIS Data	Dev	BL	Simulations		Hoge (for final development stages of algorithms)
SeaWiFS Data	Dev	BL	SeaWiFS		Parslow (for testing algorithm performance)
Simulated EOSDIS Products	Dev	BL	Simulations		Parslow (later stages of algorithm development)

Input Data Survey

Non-MODIS EOS Data Requested from EOSDIS

MODIS Facility Instrument

Team Leader: Salomonson

INPUT DATA PRODUCT NAME	DATA TYPE	TIME FRAME	SOURCE		COMMENTS
			INSTR	DATA CENTER	
Winds and Currents	Anc	PL	Other EOS		Abbott
Scatterometer supporting data for SST	Anc	PL	STICKSCATT		Barton (may be required for SST refinement)
AIRS supporting data for SST	Anc	AL,PL	AIRS/AMSU		Barton (may be required for SST refinement)
ALT supporting data for SST	Anc	PL	ALT		Barton (may be required for SST refinement)
Visible Light Polarization	Anc	AL,PL	EOSP		Gordon/Evans (to compute aerosol radiance)
Equatorial Coverage Data	Anc	AL,PL	MISR		Evans (MISR data for the region where MODIS-T changes tilt)
Atmospheric Ozone Concentration	Anc	AL,PL	Models		Gordon/Evans (low resolution (100 km) from GOMR, AIRS or AMSU)

Input Data Survey

All Input Data NOT Requested from EOSDIS

MODIS Facility Instrument

Team Leader: Salomonson

INPUT DATA PRODUCT NAME	DATA TYPE	TIME FRAME	SOURCE		COMMENTS
			INSTR	DATA CENTER	
Fluorescence Line Height (FLH)	Dev	BL	FLI/CASI	Borstad/Gower	Abbott
ATSR radiances for SST	Dev	PL	ATSR		Barton
Optical and Constituent Data Sets	Dev	BL	in-situ		Carder (USF Derived)
Calibration/Verification Optical Data	Cor	PL	in-situ		Carder
Marine Optical Buoy System Data	Dev,Cor	BL,PL	in-situ		Clark (1/2 GByte/yr pre-launch and 1 GByte/yr post-launch)
CZCS Data	Dev	BL	CZCS		Esaias
Marine Optical Mooring and Cruise Data	Cor	AL,PL	in-situ		Evans
Algorithm Validation Data	Dev	BL,AL			Evans (AVHRR, ATSR, ADEOS and CZCS data for algorithm validation)
Airborne Observations	Dev,Cor	BL,AL,PL	AOL		Hoge (mid-Atlantic test site)
Supporting Ship Observations	Dev,Cor	BL,AL,PL	in-situ		Hoge (mid-Atlantic test site)
In-situ Data Sets	Dev	BL	in-situ		Parslow (100 km areas on recurring daily basis)
In-situ Data Sets	Dev	BL	in-situ		Parslow (1000 km areas during weeks covering major cruises)
Australian Ocean Color Scanner Data	Dev	BL	AOCS		Parslow (for testing algorithm performance)
Imaging Spectrometer Data	Dev	BL			Parslow (for testing algorithm performance)

Input Data Survey

MODIS Facility Instrument

Team Leader: Salomonson

INPUT DATA PRODUCT NAME	DATA TYPE	TIME FRAME	SOURCE		COMMENTS
			INSTR	DATA CENTER	
Radiances	Cor	PL	HIRIS		Huete, West Africa, SW/US, NW/Mexico
Ground-Based Radiometer	Dev,Cor	BL			Huete
Aircraft-Based Radiometer	Res,Dev,Cor	BL	ASAS,TMS,AVIRIS		Huete
Radiances	Res,Dev,Cor	BL	TM		Huete, Arizona
Radiances	Res,Dev,Cor	BL	AVHRR		Huete, West Africa, SW/US, NW/Mexico
Radiances	Res,Dev,Cor	BL	SPOT		Huete, Arizona
	Dev	BL	MSS		Justice
Radiances	Dev,Cor	BL	TM		Justice, Brazil, Central Africa
Snow Cover	Dev	BL	SMMR		Justice
Snow Cover	Dev	BL	SMMI		Justice
NDVI, Radiances	Dev	BL	AVHRR		Justice
Meteorological Data	Cor	BL,AL,PL			Justice
Ground Data	Cor	BL,AL,PL			Justice
	Cor	BL,AL,PL	Transmissionometer	B. Holben/GSFC	Justice
	Dev	BL	SPOT		Justice, Brazil, Central Africa
Thermal Data	Dev	BL	Aircraft Instruments		Justice, For tropical burning
	Dev,Cor	PL	HIRIS		Justice
	Dev	BL	TMS,TIMS,ASAS		Justice, West & Central Africa
Digital Elevation Model	Anc	BL	AVHRR	EDC,NEPC	Muller
			ATSR1/2		Muller, AT test sites

INPUT DATA PRODUCT NAME	DATA TYPE	TIME FRAME	SOURCE		COMMENTS
			INSTR	DATA CENTER	
			GER/IRIS SE-590 Ground Spectrometers		Muller
			Airborne Spectrometers		Muller
Digital Elevation Model	Anc	BL	JERS-1		Muller
Digital Elevation Model	Anc	BL	J-ADEOS		Muller
Digital Elevation Model	Anc	BL	SPOT		Muller, At test sites
Digital Elevation Model	Anc	BL	ERS-1/2		Muller, At test sites
Digital Elevation Model	Anc	BL	Seasat	UCL	Muller
Spectral BRDF	Cor	AL,PL	HIRIS		Muller, Bands 1-224, Six sites every 10 days
Spectral BRDF		AL,PL	MISR	UCL	Muller, At test sites, Bands 1-4
	Cor	AL,PL	SAR		Muller, At test sites
Spectral BRDF/Sky Radiance				UCL	Muller
Digital Elevation Model	Anc	PL	EOS Instruments	UCL	Muller
Digital Elevation Model	Cor,Anc	AL,PL	ITIR		Muller, At test sites
		BL	Landsat TM		Muller, At test sites
Directional Reflectance	Cor	PL	MERIS		Muller
Directional Reflectance	Cor	PL	POLDER		Muller
	Dev	BL	FLI/PMI		Muller
	Dev	BL	CASI		Muller
	Dev	BL	Deadalus ATM		Muller
	Dev	BL	Collins GER		Muller
Radiances	Cor	BL	ASAS		Muller

INPUT DATA PRODUCT NAME	DATA TYPE	TIME FRAME	SOURCE		COMMENTS
			INSTR	DATA CENTER	
Radiances	Cor	BL	AVIRIS		Muller
	Cor		IGBP	NERC	Muller
	Cor	AL	CERES		Muller
	Cor	PL	AATSR		Muller
	Cor	PL	OMI/MOMS		Muller
Radiances	Cor	AL,PL	MAS	GSFC	Muller
Nitrogen fluxes, vegetation stress	Dev	PL	HIRIS		Running, HIRIS products of Aber, Wessmay, Ustin
	Dev	BL	AVHRR		Running
BRDFs, Biome discrimation	Dev	BL	MISR		Running
	Cor		LTER	U of Montana	Running
Global Climate Data	Anc	AL,PL			Running, Needed for Level-4 products
	Dev	BL	TM		Running
EarthInfo Climate & Hydrological	Dev	BL,AL,PL			Running, Available on CD
Mathews global veg. data	Dev	BL,AL,PL		NCAR	Running, Available on magnetic tape
Daily US AVHRR data	Dev	BL,AL,PL	AVHRR	EROS	Running, Available on microfiche
Weekly AVHRR GAC	Dev	BL,AL,PL	AVHRR		Running
EOS GIS	Dev	BL			Running
Snow cover	Cor		HIMSS		Salomonson
Snow cover	Cor	BL,AL,PL	HIRIS		Salomonson
Snow anisotropy			MISR		Salomonson
	Dev,Cor	BL	AVHRR		Salomonson
Snow reflectance	Dev	BL	TM		Salomonson
Atmospheric correction	Anc		AIRS		Salomonson

INPUT DATA PRODUCT NAME	DATA TYPE	TIME FRAME	SOURCE		COMMENTS
			INSTR	DATA CENTER	
	Dev	BL,AL,PL	SPOT		Salomonson
	Dev,Cor	BL	ASAS		Salomonson
	Dev	BL	AMSU		Salomonson
Ground Radiances	Dec,Cor	BL,AL,PL	PARABOLA	GSFC	Salomonson
Snow cover	Cor	BL,AL,PL	AMSR		Salomonson, Possibly
	Cor		SAR		Salomonson, Possibly
Ground Radiances	Dev,Cor	BL,AL,PL	MMR	GSFC	Salomonson, Barnes' instrument
	Cor	BL,AL,PL	ERBE		Salomonson
	Dev	BL	AVHRR (LAC)		Strahler
	Dev	BL	SMMR		Strahler
	Dev	BL	TM		Strahler
	Dev	BL	SPOT		Strahler
Radiances	Dev	BL	ASAS		Strahler
	Cor	PL	HIRIS		Strahler
	Cor	PL	MISR		Strahler
Radiances	Cor		PARABOLA		Strahler
Polarized radiance			Ground-based		Vanderbilt
Polarized radiance			Aircraft-based		Vanderbilt
Polarized radiance			Shuttle-based		Vanderbilt, with Vic Whitehead
	Anc	AL,PL	EOSP		Vanderbilt
			POLDER	French Investigators	Vanderbilt
EOSP Level-1A (Simulated)	Dev	BL,PL	EOSP		Vanderbilt, Simulation data

INPUT DATA PRODUCT NAME	DATA TYPE	TIME FRAME	SOURCE		COMMENTS
			INSTR	DATA CENTER	
MODIS Level-1A (Simulated)	Dev	BL,PL	MODIS		Vanderbilt, Simulation data
	Dev	BL	OTTER		Vanderbilt
	Dev	BL	Brazil IDS		Vanderbilt
	Dev	BL	Boreas		Vanderbilt
	Dev	BL	European Campaign (NASA)		Vanderbilt
	Dev		SAR		Vanderbilt
	Dev	PL	ITIR		Wan
	Dev	PL	HIRIS		Wan
	Cor	PL	AMRIR		Wan
Snowmelt	Dev	PL	SAR		Wan
Field Measurements	Cor	BL			Wan
	Cor	BL	TIMS		Wan
	Cor	BL	AVHRR		Wan